1867.

BOROUGH OF CARDIFF

THE

OFFICER OF HEALTH'S REPORT

ON

Sanitary Condition of Cardiff,

DURING THE YEAR 1866.

BY H. J. PAINE, M.D., M.R.C.S. &c. &c.

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CARDIFF:
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Table showing Annual Mortality of Cardiff, with Causes, for Twenty Years ending 1866.

DISEASE.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.
Convulsions	36	56	52	52	65	49	65	81	82	93	111	75	101	68	61	66	59	60	55	56
Inflammation and Dis. Brain.	2	15	12	8	5	5	8	13	13	17	21	15	19	11	25	23	15	10	15	13
Apoplexy	3	4	3	4	2	7	2	1	3	2	9	1	14	9	9	1	5	8	4	10
Paralysis	1	4	2	4	4	4	4	6	6	3	8	4	6	4	5	3	3	4	4	6
Epilepsy	0	1	3	1	2	2	3	3	5	6	11	5	3	4	1	8	3	1	2	4
Delirium Tremens	0	1	2	1	1	0	0	2	5	0	3	3	1	0	3	0	0	2	1	0
Insanity	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0
Hydrocephalus	11	11	10	1	7	10	11	8	10	8	16	19	7	14	21	3	9	11	11	6
Diseased Spine	2	0	1	1	2	5	0	0	1	3	3	1	1	0	3	1	4	0	1	3
	—55	—93	—85	—72	—88	—82	—95	—114	—126	—133	—182	—123	—152	—110	—128	—105	—99	—96	—93	—98
Phthisis	45	42	63	60	70	82	111	78	78	91	106	81	84	127	103	97	95	121	89	118
Bronchitis	18	15	18	24	32	20	24	14	51	30	30	21	15	30	63	44	29	33	69	67
Inflammation of Lungs	23	33	25	25	44	44	32	38	39	61	55	87	77	46	79	54	33	58	61	58
Pleurisy	2	0	1	0	0	0	1	0	0	1	0	2	2	5	0	1	1	3	0	2
Asthma	6	3	0	6	4	1	2	3	6	1	4	3	9	2	7	1	0	6	4	3
Hydrothorax	2	2	1	0	0	0	0	1	0	0	3	0	0	0	0	0	1	0	0	0
Empyema	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Laryngitis	0	1	1	0	1	2	0	0	2	3	0	0	0	0	1	2	0	0	1	1
	—96	—96	—109	—115	—151	—149	—170	—134	—177	—187	—196	—194	—187	—210	—253	—199	—159	—221	—224	—249
Disease of Heart	0	7	1	15	6	12	2	6	11	13	9	27	14	27	23	27	25	30	42	28
	—0	—7	—1	—15	—6	—12	—2	—6	—11	—13	—9	—27	—14	—27	—23	—27	—25	—30	—42	—28
Disease of Stomach	0	1	3	4	1	2	3	0	0	6	0	0	2	1	2	0	2	5	0	2
,, Liver	6	9	7	4	7	10	8	9	6	8	3	4	8	9	12	7	10	12	6	14
,, Bowels	4	8	5	7	9	8	4	19	9	15	15	23	12	6	11	10	4	11	14	9
,, Kidney	2	1	3	0	1	2	1	3	2	4	4	5	1	5	11	9	8	7	7	10
,, Bladder	0	0	0	0	2	3	0	0	1	0	3	0	0	0	0	2	3	5	1	4
,, Womb	0	1	2	2	2	1	3	1	0	1	1	0	0	0	0	1	2	0	1	1
,, Æsophagus	0	0	0	0	0	1	1	0	2	0	0	3	1	1	3	0	1	0	1	0
	—12	—20	—20	—17	—22	—27	—20	—32	—20	—34	—26	—35	—24	—22	—39	—29	—30	—40	—30	—40
Fever, Contd. and Typ.	72	21	49	34	35	44	38	18	10	15	20	19	42	35	13	22	56	39	42	65
,, Puerperal	6	5	3	8	7	4	6	5	6	2	6	4	9	4	10	5	8	10	10	7
,, Scarlet	1	2	25	35	12	1	1	36	19	30	5	9	87	10	4	7	153	90	21	23
,, Rheumatic	2	1	1	1	1	2	0	0	3	2	1	3	1	1	1	0	2	3	0	1
,, Intermittent	1	0	1	0	0	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0
Measles	5	11	6	22	4	6	1	96	2	43	6	6	37	2	60	17	6	41	14	4
Small Pox	11	55	5	2	0	75	42	1	0	0	161	8	0	0	1	3	0	34	44	2
Whooping Cough	4	32	3	5	9	22	20	1	12	15	8	54	8	24	11	25	26	10	17	15
Croup	3	4	0	2	19	18	6	8	13	15	10	19	12	5	38	5	13	9	11	13
Diarrhœa and Dysentery	37	61	43	16	20	24	22	26	17	25	21	16	16	15	19	9	13	27	15	19
Cholera	1	3	350	1	0	1	5	175	0	4	1	0	0	0	0	0	2	4	1	47
Choleraic Diarrhœa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Erysipelas	3	4	6	1	3	6	4	0	0	2	3	4	0	1	2	1	2	2	4	1
Diphtherite	0	0	0	0	0	0	0	0	0	0	1	5	12	5	5	10	10	2	7	4
	—146	—199	—492	—127	—110	—203	—145	—366	—84	—155	—244	—147	—224	—102	—164	—104	—291	—271	—186	—213
Anœmia	0	0	0	4	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Stomatitis	1	2	1	0	2	1	0	0	6	0	0	0	1	0	3	0	0	0	3	3
Phlegmon	2	2	0	0	1	2	0	1	6	2	7	3	4	5	3	1	2	5	5	4
Scrofula	2	2	4	3	4	5	1	6	9	4	0	2	9	4	5	6	2	4	2	2
Cangrene	2	1	0	2	0	0	2	1	6	1	3	1	2	1	1	2	1	2	1	1
Cancer	3	6	1	2	3	2	3	5	6	7	8	2	10	1	8	6	8	14	12	7
Syphilis	1	4	4	1	2	0	4	3	0	1	0	0	4	7	2	4	9	6	3	11
Hæmorrhage	1	1	0	0	0	2	1	3	0	0	1	3	2	1	0	4	6	4	4	1
Dropsy	5	6	6	4	6	7	9	14	9	14	8	10	10	9	4	5	7	7	6	7
Atrophy, Deb. and Mesentry	34	35	50	25	33	47	53	75	48	76	63	71	65	52	101	90	101	92	108	85
Hydrophobia	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Hernia	0	1	0	0	2	1	0	1	0	1	4	3	1	3	0	3	1	1	2	0
Scorbutus	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0
Teething	7	8	13	12	6	5	10	26	9	9	4	7	7	3	10	9	4	5	11	7
Exhaustion	2	2	0	0	1	0	0	0	0	3	0	3	0	0	0	0	3	2	6	1
Gout	0	0	0	0	0	0	0	0	0	1	1	0	1	0	2	0	0	0	1	0
Other Diseases	1	2	1	1	3	0	11	20	2	7	13	8	4	1	3	6	3	3	0	7
Tetanus	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	1	0
Tabes	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Disordered Joints	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Congenital	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	—61	—72	—80	—54	—64	—73	—95	—155	—96	—126	—112	—113	—125	—88	—142	—136	—148	—149	—165	—136
Age	24	34	15	21	13	22	34	34	44	24	19	38	19	26	26	30	34	30	38	32
Unknown	45	26	24	32	22	21	23	22	25	23	25	16	15	15	12	12	8	11	5	4
Accidents	2	0	0	2	0	0	0	2	0	2	4	2	10	4	5	3	4	11	4	2
Inquests	43	32	38	30	45	31	60	60	58	75	66	58	56	58	45	50	64	73	80	80
	—114	—92	—77	—85	—80	—74	—117	—118	—127	—124	—114	—114	—100	—103	—88	—95	—110	—125	—127	—118
Total	484	579	864	485	521	620	644	925	641	772	883	753	826	662	837	695	862	932	867	882

CARDIFF.

To the Local Board of Health.

GENTLEMEN,

IN directing your attention to the sanitary condition of Cardiff during the past year, I shall enter more fully than usual into the detail of collateral circumstances bearing on the subject, as the advantages to be derived from the prosecution of drainage improvements are now under the consideration of the medical advisers of the Privy Council; in consequence of which, Dr. Buchanan, to whom has been intrusted the duty of making an inquiry into the matter, has recently visited Cardiff for the purpose of ascertaining the influence on the public health effected by the complete system of drainage adopted by your Board. I have also been requested to furnish him with any data calculated to promote the object of his inquiry.

In accordance with his desire, I have furnished him with a mortuary table of Cardiff for a period of ten years preceding and subsequent to your drainage operations. Independent of this, the subject is more particularly interesting to you at the present time, as your Surveyor, Mr. Waring, has recently presented you with a very valuable Report on the drainage works already completed, as also a proposal for such an extension as he conceives necessary for the present and future requirements of the town.

It has, therefore, been essential I should arrive at a yearly estimate of the population of Cardiff. This has occupied my attention for a considerable time; but the subject is beset with great difficulties, owing to the very exceptional character of the population, considered in its relation as to yearly increase, there being such a variety of disturbing causes, which operate in a remarkable manner, occasioning oscillations from time to time in the number of the inhabitants of Cardiff. For practical purposes, I have divided the population of the town into two

sections, the first comprising what may be termed the population proper, the other the fluctuating non-resident class. The former contributes to our birth and death rates, the latter to our death rate only. It is very important to bear this in mind, as it materially effects any deductions to be made as regards the health status of Cardiff.

On my forwarding to Dr. Buchanan my yearly estimate for a given period, he returned it to me with a table representing what the estimate would have been according to the yearly rate of increase shown by the formula adopted at the Registrar General's office when considering town populations, and, pointing out the great difference observed at times in our relative calculations, requesting to be informed of any special reasons which prevent a similar rate of increase ruling Cardiff as other towns.

I have, therefore, to call your attention to the following circumstances in explanation :

The census of 1841 stated the population of Cardiff to be 10,077 ; according to the census of 1851, this had increased to 18,351, consisting of 16,265, the population proper of the town, and 2,086 seamen, who slept on board vessels in the port on the night the census was taken.

After the year 1850, a sudden and almost unprecedented increase to our population was occasioned by the influx of labourers and their families, owing to the commencement of large and important operations and other causes, the drainage and water works, the East Bute Docks, extensive house building, &c. ; and lastly, the rapidly increasing commercial trade of the port attracted merchants and others connected with its several branches. From 1850 to 1857, therefore, the population increased, not from its own natural resources, but from the constant immigration into the town of strangers : after that year, owing to the completion of the works I have enumerated, an exodus commenced, partly owing to new labour fields being opened, namely, the construction of a harbour at Penarth, and the Ely Railway on the western side of the town connecting that harbour with the Taff Vale at Radyr, and partly owing to a new supply of house accommodation in the suburbs more convenient to these works, thus absorbing the excess of occupants of houses in Cardiff.

The subjoined table illustrates the growth of house accommodation in Cardiff from 1851 to 1866 :

TABLE I.

Year.	Number of Plans for Houses passed by the Local Board of Health.	Number of Inhabited Houses according to Censuses.	Population according to Census.		The mean average of Population proper to the Inhabited Houses.	Total Population according to Census.
			Population Proper.	Seamen.		
1851	380	2565	16,265	2086	6·3	18,351
1852	328					
1853	190					
1854	123					
1855	192					
1856	356					
1857	284					
1858	240					
	——2093					
1859	160					
1860	83					
1861	40	4606	31,233	1721	6·0	32,954
1862	40					
1863	16					
1864	60					
1865	107					
1866	59					
	——565					

From this table it will be seen that in consequence of the sudden and great demand for house accommodation, 2,093 plans for houses were passed by the Local Board of Health during the first eight years; yet even with this increased supply, the common lodging-houses were much over-crowded, while a large proportion of private houses were, from the high rents and the difficulty of obtaining residences, occupied by more than one family. After 1857, from the causes I have just detailed, the population of Cardiff took for a time a downward course; and in the succeeding eight years only 565 house plans were presented to the Board of Health; Llandaff, Penarth, and Roath rapidly increasing in population and number of houses, as is shown by the following table:

TABLE II.

CENSUS, 1851.			CENSUS, 1861.		
Population.	Number of Inhabited Houses.	Average Number of Inmates to each House.	Population.	Number of Inhabited Houses.	Average Number of Inmates to each House.
Llandaff..1821	369	4·9	6585·	182	5·5
Penarth .. 105	24	4·3	1406	192	7·3
Roath.... 394	63	6·2	3044	525	5·7

The total population of the three localities, according to the census of 1851, was 2,320; at the census of 1861, this had increased to 11,035.

The annexed birth-returns equally bear evidence that disturbing causes operated in the way I have described, and required the yearly estimate of population to be based on different data to those prescribed by the formula at the Registrar General's office.

TABLE III.—BIRTH RETURNS.

Year.	Cardiff.	Llandaff.	Penarth.	Roath.
1847	331	38	0	5
1848	428	25	3	10
1849	466	41	1	10
1850	504	40	0	7
1851	575	59	0	8
1852	690	71	1	10
1853	865	70	1	11
1854	950	91	2	7
1855	1079	81	3	17
1856	1227	114	5	15
1857	1367	192	3	32
1858	1356	302	23	82
1859	1336	317	57	129
1860	1246	287	48	152
1861	1223	287	57	114
1862	1268	308	75	164
1863	1302	327	72	176
1864	1399	359	84	200
1865	1382	353	73	220
1866	1331	387	53	200

According to this return, the number of births in Cardiff, from 1847 to 1851 was merely the gradual increase of an improving district; but after that year, until 1857, the increasing number observed a rapid rate; after 1857, the number of births in Cardiff decreased for some years. Llandaff, Penarth, and Roath then showed a sudden increase, which has continued until the present time. The birth returns of Cardiff within the last few years have again shown a reaction, the population increasing from a fresh immigration occasioned by the further development of the trade of the port.

In order to arrive at a tolerably correct estimate of the population, therefore, it was necessary to consider many circumstances calculated to affect its yearly increase. The increase in the population, from the census of 1841 to that of 1851, was 80 per cent.; at least as great a rate of increase might be anticipated

during the next decennial period, liable, however, to any disturbing causes, such as I have enumerated, occasioning fluctation. The extraordinary demand for house accommodation, and the rapidly increasing birth rate, showed an unusual increase. To ascertain their effects, I ascertained, at intervals, the number of house plans passed by the Local Board of Health. I caused an imperfect, but still valuable census to be taken, by grouping together streets bearing an analogy in size and class of inmates, and by ascertaining the number of inmates in a certain number of houses; I multiplied the average of these by the total number of houses in the street; I also took into consideration the birth rates of towns similar in character of its inhabitants to that of Cardiff, namely, Liverpool and Bristol. In the first, I ascertained the birth rate to be 3·952 per cent. per annum; in the second, 3·667 per cent., the mean average birth rate of the kingdom being 3·504. In order, therefore, to be quite within the proper estimate of Cardiff, I selected the highest, and taking an excess of that, I estimated the birth rate of Cardiff to be 4 per cent. I then divided the total number of births by 4, and calculated the quotient as hundreds. These and other tests all pointed to an increase yearly quite as large as appears in my estimate, and with such an approach to accuracy, that in the Report I made to your Board in the January of 1861, I estimated the population proper of the town to be 31,175: the census in March declares it to be 31,233, the latter being only 83 in excess of my estimate.

The great difference, however, between my estimate of population and that of the census, existed in the number of seamen who slept on board vessels on the night of the 31st day of March. To enable you to judge as to the proper estimate of the average number of seamen in the port, I have, through the courtesy of Mr. Miller, the Collector of H.M.'s Customs at Cardiff, been furnished with the yearly return of vessels, with their registered tonnage, entering the port for the period of 20 years now under consideration; that return I append, directing your attention to the fact that, in 1851, with a total number of vessels that entered the port that year amounting to 7,877, and a registered tonnage of 710,669, the census of that year returns the number of seamen who slept on board 2,086; while in 1861 the total number of vessels entering the port during the year were 11,536, their registered tonnage being 1,555,133, yet the census of that year returned a diminished number of seamen

on board, namely 1,721 ; and, to make the anomaly still more apparent, the vessels were much increased in size. To make this intelligible, I insert the analysis of the two years.

TABLE IV.—THE NUMBER OF VESSELS WHICH ENTERED THE PORT OF CARDIFF FOR EACH OF THE YEARS FROM 1847 TO 1863, BOTH INCLUSIVE.

Years.	Number of Vessels Inwards.		Total Number of Vessels both Foreign and Coastwise.	Tonnage.		Total Tonnage of Foreign Trade and Coastwise inwards.
	Foreign.	Coastwise.		Foreign.	Coastwise.	
1847	633	5787	6420	77,164	367,804	444,968
1848	964	6522	7486	145,772	426,437	572,199
1849	1182	6166	7344	182,981	397,892	580,873
1850	1366	6314	7680	236,283	429,093	665,376
1851	1387	6490	7877	260,916	449,753	710,669
1852	1711	6212	7923	331,389	431,696	763,085
1853	2113	6200	8313	428,403	447,836	876,239
1854	2688	6304	8992	502,951	461,115	964,066
1855	2720	5662	8382	607,136	415,781	1,022,817
1856	3106	6018	9124	688,477	446,442	1,134,219
1857	3082	6256	9338	752,336	453,009	1,205,345
1858	2969	6406	9375	650,344	487,978	1,138,322
1859	3274	6888	10,062	786,118	548,631	1,334,749
1860	3528	7379	10,907	911,442	609,064	1,520,506
1861	3603	7933	11,536	879,778	675,355	1,555,133
1862	4292	7971	12,263	1,047,400	692,197	1,739,597
1863	4622	7715	12,337	1,135,090	684,009	1,819,099
1864	4146	7768	11,914	1,120,754	655,287	1,776,041
1865	3879	7678	11,557	1,127,560	662,723	1,790,283
1866	4335	7573	11,908	1,379,350	646,655	2,026,005

TABLE V.—A RETURN OF VESSELS, WITH REGISTERED TONNAGE, ENTERING THE PORT OF CARDIFF IN THE TWO CENSUS YEARS, 1851 AND 1861.

Years.	Foreign Vessels.	Average Registered Tonnage.	Coastwise.	Average Registered Tonnage.	Total Number of Vessels.	Average Registered Tonnage.
1851	1387	188	6490	60	7877	90
1861	3603	244	7933	85	11,536	134

The cause of this apparent anomaly depends on the prevalence of particular winds. During the last few days of March, 1861, strong easterly winds prevailed, causing a very large fleet of vessels to leave the port, and retarding others from entering ; this was especially noticed the time the census was taken. Had the direction of the wind been from the west, there would probably have been found a considerable excess of seamen over the estimated average.

I have entered thus fully into the circumstances under which the yearly estimate of the population of Cardiff has been made. It is of the most essential importance it should be accurate, as upon it are based all calculations bearing on the sanitary condition of the town.

With these preliminary remarks, I will now draw your attention to a brief history of the sanitary progress effected in Cardiff during the last twenty years. The following may be taken as its state in 1847, when the history commences.

The alarming outbreak of cholera in the town, in 1849, caused much anxiety in the public mind, and an application was made to the General Board of Health that a Superintending Inspector might be directed to make an inquiry with a view to consider the expediency of applying the Public Health Act to the town. Mr. Rammel was appointed to conduct the inquiry, and he elicited the following facts.

The ground upon which the town of Cardiff is built is nearly a dead flat, and very little above the ordinary rise of the sea. The old part of the town, which is that furthest from the mouth of the river, is but slightly raised above the general level: the highest point, the Town Hall, is not more than ten feet above that level. The general surface of the flat is about two feet below the spring tide level, about eight feet above the level of high water.

The substratum of the older or inland portion of the town, as far down as Whitmore Lane, is a gravel which quickly absorbs the surface water; from this line down to the sea, the gravel is overlaid by a stiff black clay. In the upper part of the town, the gravel is from 6 to 8 feet thick; under it is hard red marl, which holds up the water, so that after continuous rains the cellars are liable to be flooded from the accumulation of the land water. At 18 or 20 feet a little water is found, and at from 25 to 30 feet water is very abundant.

Beyond a partial means of carrying away the surface water and house slops, there was no provision for drainage; the existing drains were not drains in the ordinary description of the word, but a succession of pits connected by a covered way, in which deposits accumulated until they were removed by manual labour. Even the surface drainage was insufficient, and at times part of the town was flooded. This was especially the case in that portion of the Newtown district built on the stiff black clay. The surface water remained here, and in localities similarly

situated, was mixed with house refuse, and became a source of disease of a zymotic character.

Privy accommodation was very bad and inadequate, especially in Stanley-street and Whitmore-lane, and as none were allowed to be connected with the existing drains, the cesspool matter percolated through the porous gravel and polluted the wells.

The supply of water was very inadequate throughout the town. In the poorer districts there were no pumps to the houses, and water was obtained at great cost of labour from four public pumps. In many districts, from the circumstance alluded to above, the water was quite unfit for domestic purposes.

The dwellings of the poor were overcrowded, owing to the excessive high rents; cottages, which could not have cost £40, were let at £6 10s. a-year; these consisted of only two rooms. 54 persons lived in one house in Stanley-street, in another 45, in another 36. No regard was made to decency, many of the lodgers lying on the ground floor. Each party had with them all their stock, consisting of heaps of rags, bones, salt fish, and other things. The stench in these houses was horrible.

There were 45 courts, with 327 houses. The ground was neither pitched nor paved. The entire absence of drainage caused the ground to be saturated with offensive matter; very few of the houses had privies. The public privies were in a filthy uncovered condition, and no water supply either by pumps or other means.

In some of these courts and streets, epidemic disease was hardly ever absent. The following extract has been made, of the extent of three epidemics in certain streets or courts, where preventable causes existed, to illustrate the serious results.

TABLE VI.

Localities.	Number of Houses.	Cases of Typhus Fever. 1846-7.	Cases of Typhus Fever. 1847-8.	Cases of Dysentry. 1847-8.	Condition of locality.
Stanley-street ..	30	75	23	13	Overcrowded districts.
Landore-court ..	28	48	24	8	
Kenton-court....	9	25	5	3	Lodging-houses.
Little Frederick-st	27	14	14	5	

DEATHS FROM CHOLERA, 1849.

Stanley-street	19
Landore-court	12
Kenton-court	13
Little Frederick-street	10

Having thus described the condition of the town in 1847, I will now direct your attention to the following table; and by enumerating the various periods at which sanitary improvements were effected, the result may be recognized.

TABLE VII.

Years.	Estimated Population.	Births.	Deaths.	Excess of Deaths over Births.	Excess of Births over Deaths.	Rate of Deaths to every 1000 Inhabitants.
1847	14,300	331	484	153	..	33·84
1848	15,100	428	579	151	..	35·34
1849	16,000	466	864	395	..	54·00
1850	16,900	504	485	..	19	28·69
1851	18,351	575	525	..	50	28·60
1852	21,500	696	620	..	76	28·83
1853	24,000	865	644	..	221	26·83
1854	26,500	950	925	..	25	34·90
1855	29,500	1079	641	..	438	21·72
1856	34,923	1227	772	..	455	22·10
1857	38,000	1367	883	..	484	23·23
1858	37,000	1356	753	..	602	20·35
1859	37,000	1336	826	..	510	22·32
1860	35,000	1246	662	..	584	18·91
1861	35,000	1223	837	..	386	23·91
1862	35,700	1268	695	..	573	19 46
1863	36,000	1302	862	..	440	23·94
1864	36,500	1399	932	..	467	25·53
1865	37,000	1382	867	..	515	23·43
1866	37,500	1331	882	..	449	23·52

The average yearly rate of deaths on the decennial period ending in 1856 was 30·12 to every 1000 inhabitants; the subsequent ten years, this fell to 22·20. The columns bearing on the comparative number of births and deaths require the observation, that in 1850 an inquiry took place as to the possible neglect of parents in registering the births of children, and means were taken to obtain a more perfect registration. Although there was doubtless up to 1851 an excess of deaths over births, showing a deplorable sanitary condition, yet the excess did not exist to the degree mentioned in that column, owing to this defective registration.

After the cholera epidemic of 1849, the first attempt at sanitary reform was made by a frequent inspection of localities

where excitant causes of diseases might be expected to exist. A registration of common lodging-houses was enforced as soon as the Health of Towns Act was applied to Cardiff. The number of inmates was greatly reduced. Wherever houses did not possess the proper requirements, the necessary license was withheld; but as a difficulty was experienced as to what constituted a common lodging-house, on the passing of the Disease and Nuisance Removal Act, this regulation of lodging-houses was abandoned; houses suspected to be overcrowded were visited, and the number of inmates the house could accommodate was certified. 250 feet cubic space was allowed for each occupant of a bedroom, and 350 feet cubic space for a day and night room. This allowance has since been increased to 400 feet cubic space, and as far as practicable no bedroom is allowed to be occupied during the day. The windows are then required to be kept open, and the bed-clothes thrown back; the walls are required to be white-limed as often as necessary, and the floors constantly washed. Whenever sickness of an unusual character or extent prevails, the Inspector of Lodging-houses reports the circumstance to me. All nuisances and collections of refuse house-matter are prohibited; covered ashpits, at first required, are now done away with, as these became the receptacles of vegetable and other matter undergoing decomposition, and consequently dangerous to health. Occupiers of houses are now obliged to place all refuse matter in a box before the door every morning, that it may be carted away by the scavenger. This works remarkably well. The proper amount of privy accommodation is also enforced; but the filthy habits of the lower class of Irish labourers require these to be constantly inspected, and the greatest difficulty is experienced in keeping them in order.

In March, 1857, the first main of the New Water Works Company was laid on. From March to December of that year, 1038 houses were supplied. At the present time it is computed there are are not 100 unsupplied by the Water Works Company. The total number of houses supplied by the Company up to March, 1867, including the suburbs, is 6748. There are 358 cottages supplied at the rate of 2d. and under per week, the supply of water being supplied from the River Ely. An analysis of the water was made by Professor Brande, who reported it to be very pure and well fitted for domestic and drinking purposes; but as large iron works have been recently established at Llantrissant, as a necessary consequence populous villages may

be expected to spring up on the banks of this river. The Company have, therefore, in anticipation sought other sources of supply, especially from the mountain springs at Lisvane; here a large reservoir has been made, capable of containing about 100,000,000 gallons, or 70 days' supply, with very extensive filter beds. The Company's mains are supplied on the constant principle, and no cisterns are in consequence rendered necessary, the water being drawn by the consumer fresh from the main pipes. At my request a recent analysis of this water has been made by Prof. Miller, of King's College, who reports as follows :—

ANALYSIS OF THE CARDIFF WATER WORKS COMPANY'S WATER.

	Grains.
Carbonate of lime	11·54
,, magnesia	2·17
Sulphate of magnesia	1·10
Chloride of magnesium	0·77
Chloride of sodium	0·60
Combustible and organic matter	0·60
Nitric acid	A trace.
Ammonia	0·02
Total grains per gallon	16·76

Hardness before boiling, 13·4 degrees; after boiling, 5 degrees. The water is clear, and has no perceptible taste or smell; it contains but a small proportion of organic matter, and exerts but little action on permanganate of potash; it is free from nitrates, and contains but very little ammonia. The hardness of the water is not great, and it softens to a considerable extent on boiling, and the water is an excellent one for domestic uses.

In 1853, the system of drainage proposed by Mr. Hawkshaw was adopted by your Board. The first section of the original contract was made available in 1855 to the Newtown district, this being the portion of the town nearest the outlet, and fortunately most requiring the aid of drainage, it being chiefly occupied by the labouring Irish families, and is at a level in some places below high water; its subsoil being an alluvial clay, which retains on its surface stagnant water, mixed with decomposing animal and vegetable matter, thereby generating gaseous exhalations extremely dangerous to health. The following year, namely 1856, the remaining portion of the original contract was completed, and made available to the whole of the town. According to the report of Mr. Waring, this was done at a cost of £26,624 15*s.* 7*d.* Two years afterwards, in consequence of the rapidly increasing growth of the town, an extension became

necessary, thereby raising the cost to £37,000. Although table No. VII. shows a gradually improving sanitary condition of Cardiff from the year 1850, when sanitary regulations were first commenced, it was on the completion of the drainage works in 1856 this improvement became manifest in a high degree. According to this table, in the first decennial period, ending 1856, the mean annual rate of mortality in Cardiff was 30·12 to every 1000 of the inhabitants ; in the next decennial period this was reduced to 22·20 per thousand, thus showing an annual saving of eight lives to every thousand of the inhabitants, or estimating the average number of inhabitants as 36,000, a clear yearly saving of 288 lives, or in the ten years a total saving of 2880. The completion of the drainage works enabled your Board to execute two other important sanitary measures, namely, to pitch and pave upwards of sixty streets, where the roadways presented a large area surface of putrescent mud and stagnant water ; and all the courts alluded to in this Report were flagged. These improvements necessitated a further outlay of £6,627.

The cost of saving these 2880 lives in 10 years may be estimated as follows :

Drainage works to date... ...	...£37,000
House drainage	... 20,000
Street and court improvements ...	... 10,000
Sundry works, say	... 3,000
Total...	...£70,000

In order to show that, independently of this important saving of life, the £70,000 has been wisely expended in a money point of view, I re-introduce an extract from Dr. Gardner's work on public health. It is an hypothetical balance-sheet drawn out by Mr. McGowan, Assistant Town Clerk of Liverpool, read before the Social Science Association in 1858. The estimate of the value of a productive human life to the community is partly founded on an elaborate inquiry by Dr. Farr into the money value of a man, and is decidedly moderate. The estimated cost of sanitary works, supposed to last for upwards of twenty-five years, is founded on actual data derived from experience.

The result is, irrespective of the value of each person to his own life, minus the pecuniary value to the community of young lives saved, which, when lost, cause a dead loss of all the

money which each life has had expended on it, because none of such outlay can be repaid of; adult lives already saved during the progress of the works; and the mental as well as bodily suffering prevented, which, though of the greatest moment, are incapable of reduction to a money standard.

SANITARY ECONOMY IN LIVERPOOL.

1st. Assuming there have been about 3,750 lives per annum saved to Liverpool by sanitary measures, taking half as males, and four-tenths or 750 as productive, the gain to the community in respect to these at £300 per life will be (300 × 750) ...	£225,000
2nd. And the productive females at half the value	112,500
3rd. Taking the loss by incapacity to work and expenses on sickness in 70,000 families at £4, which in a town made healthful is saved (70,000 × £4)...	280,000
Or a total annual saving of	£617,500
Which at twenty-five years purchase would produce the sum of	15,437,500
Deducting outlay for public works, £859,387 Ditto, private drainage 200,000	1,059,387
There would remain a net gain to the community of	£14,378,113

Taking for granted the data furnished by Mr. McGowan as correct, and the assent given by Mr. Farr, than whom there are none, from their lengthened experience in statistical matters, more capable of giving an opinion, you have only to calculate the difference between 300 as the lives annually saved in Cardiff with 3,756 those saved in Liverpool, as also the relative cost, and you can arrive at a tolerably accurate conclusion as to the value attained through your sanitary operations.

I have now to direct your attention to the sanitary condition of Cardiff during the year 1866, as indicated by its mortality.

The various local causes calculated to affect the public health have been already alluded to.

The thermal influences were as follows:

The month of January was wild, more so than for many

years. There was a daily average exceeding 5° over the ordinary temperature of the month. The weather was frequently very tempestuous, especially on the 11th, on which day much rain fell. The month throughout was wet, the rain-fall being 5.04 inches. It rained on 25 days, the greatest depth in one day being 0·64 inches, on the 12th. The mortality was below the average. There were few deaths from inflammatory affections; but fever, which was more or less prevalent throughout the country, was fatal in 16 cases.

February continued mild until the middle, when the weather became exceedingly cold. Throughout the month, more or less boisterous winds prevailed. The rain-fall was 4·60 inches, and there were 22 wet days. There were few deaths from inflammatory affections, and nine from fever.

March was very cold, there being a daily average of 3° below the ordinary temperature of the month until the middle, when the temperature became in excess. The rain-fall was 2·30 inches, with twenty wet days. Inflammatory diseases were more prevalent, and 11 deaths were registered from fever.

April continued cold the earlier part of the month; after this it was mild, continuing so until the end. The rain-fall was 2·00, with 19 wet days. Inflammatory diseases increased, but a subsidence of deaths from fever took place, only 6 deaths from this cause being registered.

May was cold throughout the month, being 3° below the daily average. The rain-fall was only 0·98, and only 11 wet days. This was the driest month throughout the year. Six deaths were registered from fever; inflammatory diseases continued prevalent and fatal.

June was cold throughout the first half of the month, the latter half was hot. The rain-fall was 3·71, with 19 wet days. Only two deaths were registered from fever, and one from cholera.

July was generally fine and warm. The rain-fall was 3.41, with 12 wet days. The public health was good, and the number of deaths below the average. Another death was registered from cholera.

August was wet, cold, and boisterous. The rain-fall was 3·65, with 21 wet days. Cholera now appeared in an epidemic form; in other respects the general health of the town continued good.

September also was very wet and cold. The rain-fall this

month was greater than in any month throughout the year—12.09 inches fell during the month. The number of wet days was 28. On the 4th of the month the unprecedented rainfall in one day amounted to 3.21 inches. Cholera and diarrhœa continued fatal, with scarlatina.

October was mild but variable, with moderate rain, and at times foggy. The rainfall was 3.09, and rain fell on 14 days. Cholera and diarrhœa still continued.

November was mild, and at times windy. The rainfall was 3.34 inches, with 13 wet days. Cholera had disappeared, some cases of scarlatina still occurred.

December had a high range of temperature throughout the month, with heavy gales from the south-west. In the middle of the month a severe thunderstorm occurred. The rain-fall was 5.19 inches, and rain fell on 22 days. The general health of the town throughout the month was good.

TABLE IX.—RAIN-FALL IN 1866, AT TOWN HALL, CARDIFF.

Months.	Total Depth.	Deepest fall in 24 hours.		Number of days on which 0.1 or more fell.
	Inches.	Depth.	Date.	
January	5.04	0.64	12th.	25
February....	4.60	0.70	8th.	22
March	2.30	0.52	28th.	20
April	2.00	0.68	28th.	19
May	0.98	0.50	10th.	11
June	3.71	0.98	1st.	19
July	3.43	0.67	4th.	12
August.....	3.65	1.34	6th.	21
September ..	12.09	3.21	4th.	28
October	3.09	1.08	24th.	14
November ..	3.34	0.91	10th.	13
December ..	5.19	0.86	5th.	22
Total	49.42			226

The temperature throughout the year was on the whole below the average. The rain-fall was 49.42 inches, an excess of the yearly average observed for the twenty years in Cardiff, which has been 46.

The estimated population of Cardiff in 1866 is 37,500.

1331 births were registered during the year, and 882 deaths, showing an excess of 449 births over deaths; of these deaths 447 were males, and 435 females.

The deaths were distributed over the year as follows:

Winter	January	75	
	February	81	
	March	91	
			247
Spring	April	83	
	May	69	
	June	56	
			208
Summer	July	57	
	August	68	
	September	103	
			228
Autumn	October	79	
	November	53	
	December	67	
			199
	Total		882

The mean annual death rate of town populations for 10 years was 24·25, that of country towns 19·89.

The death rate in Cardiff for 1866 has been 23·54 to every 1,000 inhabitants. The mean death rate throughout the kingdom has been 23·62 in 142 districts, and 56 sub-districts, comprising the chief towns, 26·39, and in country districts 20·10 per 1,000.

The death rate throughout the kingdom in 1866 has been above the average, indicating an undue amount of mortality from Zymotic diseases; it is, therefore, satisfactory to find that, although Cardiff was visited by epidemic cholera, its death rate was slightly under the mean death rate of the kingdom, and 3 per 1,000 less than that ruling town populations. [The severe remarks used by the Registrar General when he states—"While the industry of Wales is making rapid strides, its sanitary condition is rapidly deteriorating; and thus in a country every way by nature favourable to health, both as regards air and water, epidemics find footing and prove destructive,"—however applicable they may be to Wales generally, cannot with justice be applied to Cardiff.]

The death rates on the quarters, compared with the death rates ruling the kingdom and town populations, stand thus:

TABLE X.

	Cardiff.	Death Rate per Thousand.		
	Total Deaths.	Cardiff.	Town Population.	Kingdom generally.
Winter Quarter	247	26.34	29.67	26.53
Spring do.	208	22.18	26.41	24.37
Summer do.	228	24.32	25.15	21.82
Autumn do.	199	21.22	24.32	21.84

From this table it will be seen that the mortality of Cardiff throughout the four quarters was considerably less than the mortality ruling town populations, and with the exception of the Summer quarter, when the town populations were suffering in many places from the epidemic disease then prevalent in England, Cardiff had a less mortality than that of the kingdom generally.

The deaths occurred at the following ages:

Under One Year				203	
Above One	and under	Two Years		83	
„ Two	„	Three Years		26	
„ Three	„	Four Years		24	
„ Four	„	Five Years		21	
					357
„ Five	„	Ten Years		33	
„ Ten	„	Fifteen Years		17	
„ Fifteen	„	Twenty-five Years		82	
„ Twenty-five	„	Thirty-five Years		89	
„ Thirty-five	„	Forty-five Years		91	
„ Forty-five	„	Fifty-five Years		74	
„ Fifty-five	„	Sixty-five Years		62	
„ Sixty-five	„	Seventy-five Years		44	
„ Seventy-five	„	Eighty-five Years		25	
„ Eighty-five	„	Ninety-five Years		8	
					525
					882

Of the total number of deaths 23.01 per cent. die under the age of one year, and 40.47 under five years.

Of the 1,331 births 26 per cent. die under the age of five years, or rather less than 1 in 4 fail to reach that age.

Comparing Cardiff with Liverpool and Bristol, the proportion of infantile, or those deaths under 5, to every 1,000 population, the rate is as follows:

Liverpool	14.46.
Cardiff	9.52.
Bristol	9.49.

From this it will be observed that Cardiff but little exceeds the infant mortality of Bristol, and is one-third less than Liverpool; still the infantile death rate is high. In rural districts the infantile death rate varies from 13 to 21 per cent. of total death rates, against 23 in Cardiff. This excess can but be attributable to causes existing specially in town districts like Cardiff, and may be described as follows:

Deaths by old age has been stated as the only normal death of man. Relatively, therefore, as death takes place in early life, it is indicative that a population is exposed to causes operating against that which should be the natural termination of man's existence. A town like Cardiff must, even with the most careful sanitary provisions, afford a higher rate of infantile death than in rural districts, or even in large towns where the greater number of inhabitants are not composed of the labouring classes but little removed from mendicancy, as is the case with our Irish labourers. The children of this class are exposed to the consequences arising from improper, and in many instances, deficient food, inability of the parent to devote her time to nursing, with errors from ignorance in the proper system; the impure and vitiated atmosphere of the room, owing to its being too frequently occupied by day as well as night, thus preventing ventilation: all these can but be fatal in a great degree to the children of thickly populated mercantile towns, at a time when the tenacity of life is most feeble. From the large number of deaths registered in Cardiff under the headings of convulsions, atrophy, debility, and mesenteric disease, causes doubtless to be much controlled by constant watching, and the enforcement of the powers applicable to lodging houses; but there are other aids which patrake of what may be termed persuasive moral character—I mean such as emanate from a Society called the Ladies' Sanitary Association, which has for some time been established in the metropolis with immense benefit to the poorer classes, and which is now being introduced into provincial districts; and through the energy and zeal of Miss Page, a branch has recently been formed in this town, and under her management important results may be anticipated.

The saving and protection of infant life is desirable also in other though more remote degrees. I therefore introduce *in extenso* the remarks bearing on this subject introduced by Mr. Simon, Medical Officer of Privy Council, in his valuable report of the sanitary state of the people of England:—"The

TABLE XI.

DISEASE.	Total.	Per Thousand.	Per Thousand in the Kingdom in 1864.	DISEASE.	Total.	Per Thousand.	Per Thousand in the Kingdom in 1864.
Convulsions	56	1·493	1·288	Croup	13	0·346	0·329
Inflammation & Dis. Brain	13	0·346	0·322	Diarrhœa and Dysentery	19	0·506	0·847
Apoplexy	10	0·266	0·501	Cholera	47	1·253	..
Paralysis	6	0·160	0·315	Choleraic Diarrhœa	12	0·320	..
Epilepsy	4	0·106	0·117	Erysipelas	1	0·026	0·102
Delirium Tremens	0	..	0·029	Diphtherite	4	0·106	..
Insanity	0	..	0·932		—213	5·680	..
Hydrocephalus	6	0·160	0·374	Anœmia	0	..	..
Diseased Spine	3	0·080	..	Stomatitis	3	0·080	0·049
	—98	2·613	..	Phlegmon	4	0·106	0·151
Phthisis	118	3·146	2·739	Scrofula	2	0·053	0·013
Bronchitis	67	1·786	1·894	Gangrene	1	0·026	..
Inflammation of Lungs	58	1·546	1·189	Cancer	7	0·186	0·394
Pleurisy	2	0·053	0·046	Syphilis	11	0·293	0·075
Asthma	3	0·080	0·205	Hæmorrhage	1	0·026	..
Hydrothorax	0	..	..	Dropsy	7	0·186	0·539
Empyema	0	..	..	Atrophy, Deh. & Mesentery	85	2·266	2·135
Laryngitis	1	0·026	0·078	Hydrophobia	0	..	..
	—249	6·640	..	Hernia	0	..	0·039
Disease of Heart	—28	0·746	1·835	Scorhutus	0	..	0·019
,, Stomach	2	0·053	0·133	Teething	7	0·186	0·208
,, Liver	14	0·373	0·382	Exhaustion	1	0·026	..
,, Bowels	9	0·240	0·394	Gout	0	..	..
,, Kidney	10	0·266	0·244	Other Diseases	7	0·186	0·079
,, Bladder	4	0·106	0·809	Tetanus	0	..	..
,, Womb	1	0·026	0·053	Tahes	0	..	..
,, Æsophagus	0	..	..	Disordered Joints	0	..	0·086
	—40	1·066	..	Congenital	0	..	..
Fever, Contd. and Typ.	65	1·733	0·997		—136	3·626	..
,, Puerperal	7	0·186	0·073	Age	32	0·853	1·434
,, Scarlet	23	0·613	1·443	Unknown	4	0·106	..
,, Rheumatic	1	0·026	0·124	Accidents	2	0·053	..
,, Intermittent	0	..	..	Inquests	80	2·133	..
Measles	4	0·106	0·404				
Small Pox	2	9·053	0·373	Total	—882	23·520	..
Whooping Cough	15	0.400	0·416				

death rates of young children are in my opinion among the most important in sanitary science. In the first place their tender young lives, as compared with the more hardened and acclimatized lives of the adult population, furnish a very sensitive test of sanitary circumstances, so that difference of infantile death rates are, under certain qualifications, the best proof of deficiency of household condition in any number of compared districts; and secondly, those places where infants are apt to die are necessarily the places where the survivors are most apt to be sickly, and where, if they struggle through a scrofulous childhood to realise an abortive puberty, they beget a still less likelier brood than themselves, even less capable of labour, and even less capable of education. It cannot be too distinctly recognised that a high local mortality of children, must also necessarily denote a high local prevalence of those causes which determine a degeneration of race."

The annexed table gives the various causes of death for the year 1866, with the relative rate ruling Cardiff, as against that of the Kingdom generally. *(See Table* XI.*)*

In considering this table it is necessary to observe that the mortuary rate of the kingdom is that of the year 1864, this being the latest return of which I have been enabled to avail myself. Allowance, therefore, must be made for the different periods to which the table refers, 1864 being free from epidemic Cholera, and Choleraic Diarrhœa; Typhoid Fever, also, did not exist in the severe form of 1866.

Among Sporadic diseases of known seat, the mortality of Cardiff is slightly under that ruling the kingdom, except in deaths from Phthisis.

In a town constituted, as I have already described Cardiff to be, Phthisis and Strumous diseases must be expected to contribute more largely to the mortuary table than towns where the labouring classes do not form so large a proportion of their inhabitants, and these diseases are found to exist largely among that part of our population spoken of as Irish mendicant labourers.

Dr. Aitken in speaking of Tubercular diseases (Phthisis and Struma), states: "There are several circumstances which show the great influence of public sanitary measures in controlling the ravages of consumption, when these measures are scientifically directed to the preservation of the general health, and especially when men are associated together in great commu-

nities, an influence much greater than the best directed efforts of the medical profession can establish through their Materia Medica."

Of late years, Phthisis, Atrophy, Mesenteric Diseases, deaths from Infantile Debility, Hydrocephalus, and Convulsions of the Hydrencephaloid character, have much diminished in fatality. This diminution has been attributed in a very great degree to hygienic measures, a result naturally to be expected. Largely dependent as these diseases are on a depraved condition of system, aggravated by improper food, ill-ventilated dwellings, and want of personal cleanliness, it is not confined to Zymotic diseases alone, that we must look for the advantages to be derived from sanitary provisions; but experience has shown us there are other and collateral benefits to be attained.

Inflammatory affections of the respiratory organs contributed in some degree to the higher rate of mortality in Cardiff for 1866. These diseases were occasioned by the cold and frequently sudden changes of temperature prevalent throughout the spring month.

Zymotic diseases, at all times important, inasmuch as they occasion one-fourth of the mortality of the kingdom, in 1866 obtained especial interest. These diseases are mainly dependent on preventable and removable causes. In the tables constructed in this Report, it will be found that upon every occasion when the mortality of the town for the year is in excess of the average rate, that excess is due to the prevalence of epidemic or endemic disease. Mr. Simon, from whose valuable paper on the Sanitary State of the People of England I have before quoted, states, in reference to this class of disease, that "a large share of the premature mortality of England depends on diseases respecting which it cannot be conceded that they are to a certain extent inevitable; on the contrary, thousands of deaths annually result from diseases which in the most absolute sense are preventable: diseases which either will not arise or will not spread in communities which follow certain well known sanitary laws; for, first, there are certain diseases of which it is hardly a metaphor to say, that they consist in the extension of a putrefactive process from matters outside the body to matters inside the body, diseases of which the very essence is filth; diseases which have no local habitation except where putrifiable air or putrifiable water furnishes means for their rise or propagation; diseases against which there may be found a complete security in the cultivation of public and private cleanliness. Yet some tens of

thousands of deaths annually arise in England from these diseases. And again, there are diseases of other kinds, which annually kill some thousands more of our population, though the appointed preventatives are so definite and so accessible that scarcely a death from such causes ought to occur in any civilized country."

The cases thus alluded to are—

1. Absence of, or inefficient drainage.

2. The vitiated atmosphere arising from undrained and unsewered streets and courts, in towns otherwise well drained.

3. Cesspools, foul drains, and open surface gulleys close to dwelling-houses.

4. Impure or inadequate water-supply.

5. Overcrowded and ill ventilated dwellings.

6. Exhalations from noxious trades, as improperly constructed tallow-melting establishments, slaughter-houses in towns, especially when the premises are ill adapted for the purpose or not kept thoroughly clean; fish and vegetable stores, when such matter is allowed to accumulate and decompose.

7. Stagnant water near to dwellings.

8. Dwelling-houses occupied when the walls are damp, have been considered one of the excitant causes of cholera, when that epidemic has been prevalent in a locality.

These are the causes of zymotic disease. The presence even of one, all other circumstances being favourable to health, is sufficient to produce undue sickness and death. Manchester, described by Mr. Leigh, Registrar of Deaths, as well pitched and paved, well supplied with pure and wholesome water, its streets kept constantly clean by an organized body of scavengers, no collection of filth allowed to lie and rot in the streets, no pools of stagnant water, its artisan well fed and clothed,—yet Manchester is one of the most unhealthy towns in the kingdom. Its noxious trades, its extensive tallow-melting establishments, its slaughter-houses poisoning the sewers with ordure and effete matter, its graveyards where interments are still daily made, give Manchester its unenvied notoriety for a high rate of mortality.

In the country, how often is the contiguity of the farmyard to the dwelling-house, with the pool of liquid manure close to its very walls, a source of fever! A short time back, I had reason repeatedly to pass some cottages formerly used as outbuildings, belonging to a farm situated on the side of a hill, where everything appeared conducive to health. They were kept clean

and wholesome, the inmates respectable agricultural labourers and their families; but closely adjacent were the soakings and the overflow of a cesspool exposed to the rays of the sun, and poisoning the atmosphere with fœtid exhalations. I repeatedly warned the inmates of the danger to which they were exposed, and the attention of the owner was ineffectually called to the subject. I was shortly after requested to visit one of the cottages, to find my prognostication fulfilled, and then, as is too often the case, when fever and death had done their worst, the cause of all was removed.

The following table (No. 12.) will show the beneficial effect on zymotic diseases produced by the adoption of sanitary measures, commenced, as before stated, in 1851, and completed in 1856, when the main drainage came into operation. In the last column of this table, the principal zymotic diseases prevalent in each year are mentioned. The names in this column distinguish those diseases that have produced a mortality in excess of the ordinary rate.

TABLE XII.

Years.	Inquests.	Deaths from Sporadic Causes.	Deaths from Zymotic Causes.	Totsl Deaths.	Per Centage of Deaths from Zymotic to Total Causes.	Chief Zymotic Diseases prevalent during the year.
1847	43	295	146	484	30·16	Fever, Small Pox, Diarrhœa and Dysentery.
1848	32	348	199	579	34·37	Fever, Small Pox, Whooping Cough, Diarrhœa, and Dysentery.
1849	38	334	492	864	56·94	Fever, Scarlatina, Diarrhœa, Dysentery, Cholera.
1850	30	328	127	485	26·18	Fever, Scarlarlina, Measles.
1851	45	366	110	521	21·11	Fever, Croup.
1852	31	386	203	620	32·74	Fever, Whooping Cough, Croup, Diarrhœa.
1853	60	439	145	644	22·51	Fever, Whooping Cough, Croup, Diarrhœa, and Dysentery.
1854	60	499	366	925	39·56	Measles, Diarrhœa, Dysentery, Cholera.
1855	58	499	84	641	13 10	Searlatina, Croup, Diarrhœa.
1856	75	542	155	772	20·07	Scarlatina, Measles, Diarrhœa.
1857	66	573	244	883	27·63	Small Pox, Diarrhœa.
1858	58	548	147	753	19·52	Whooping Cough, Croup, and Diarrhæa.
1859	56	546	224	826	27·11	Fever, Scarlatina, Measles, Croup.
1860	58	502	102	662	15·40	Whooping Cough.
1861	45	628	164	837	19·59	Measles, Croup.
1862	50	541	104	695	14·96	Croup.
1863	64	507	291	862	33·78	Fever, Scarlatina, Whooping Cough, Croup.
1864	73	588	271	932	29·08	
1865	80	601	186	867	21·45	Fever, Small Pox, Diarrhœa, and Dysentery.
1866	80	595	213	888	23·98	Fever, Scarlatina, Diarrhœa, Dysentery, Cholera.

The total number of deaths from zymotic diseases during the period of ten years ending 1856 was 2,027, the average population being 21,707; while in the corresponding period of ten years ending 1866, with an increased average population of 36,470, the deaths from zymotic diseases were less, being 1,946.

In 1866, continued fever was fatal in 65 cases, or in the proportion of 1·70 to every 1,000 inhabitants, the ordinary yearly fever death rate being 1·0 per 1,000. The mortality, therefore, from fever in Cardiff was 28 in excess of what it should have been; but taking the yearly average of Cardiff during the two decennial periods, the first, or that ending in 1856, the yearly fever mortality was 1·54 per 1,000, against ·90 per 1,000 ruling the period ending 1866. It is also to be observed that fever had more or less prevailed to an unusual extent throughout the kingdom during the last three years, and considerable anxiety was experienced from this circumstance, inasmuch as cholera had been making its gradual advance from the east, and the causes predisposing and excitant of the two diseases are the same.

An element of danger to which Cardiff is exposed, in common with other large ports engaged in foreign trade, arises from the possibility of epidemic disease being imported into the town through the shipping. This evil, to my mind, had long been a subject requiring serious consideration, and some provision adopted to meet its exigencies. Fever and small pox cases had again and again been received into the Union House from vessels in this port, and from the various seamen's boarding-houses. A considerable proportion of deaths from these diseases in that establishment have been those of sailors. The importation of yellow fever into Swansea, by the *Hecla*, from Cuba, laden with copper ore, whereby 13 deaths from that disease occurred in the harbour, another on board the *Eleanor*, and one in Llanelly, directed public attention to the circumstance, that the rapid transit now effected through the employment of steam power in our commercial trades exposed us to the dangers of disease from which this country was before exempt; and that such diseases when imported spread, not merely by actual contagion, but by miasma among the people. The necessity of a provision to meet this danger I have frequently impressed on your Board. In the Registrar General's Report for the quarter ending December 1865, he says, in allusion to the invasion of yellow fever at Swansea, and cholera at Southampton,—"The importance of

attention to the hygienic condition both of our merchant vessels and our seaports is clearly seen ; for a foul ship, instead of merchandise, carries from land to land the seeds of depopulating diseases, and a foul seaport supplies the soil in which they rankly germinate."

Exertions were therefore made to establish a Seamen's Hospital for this port ; and through the great exertions of Mr. Boyle, the trustee of the Marquis of Bute, Government was induced to grant the loan of a large frigate, to be fitted up for such an institution. This has been accomplished in a most satisfactory manner, and is eminently successful both in the interests of the town as well that of the unfortunate sailors who previously stood so much in need of assistance. Up to this time 268 in-patients have been received on board the *Hamadryad*, several of these being cases of malignant typhus, which but for this Hospital Ship must have been taken as heretofore either into the Union, to the danger of the inmates, or else received into seamen's boarding-houses, scattered over the Bute Dock district, and thus spreading disease throughout the town.

Infantile epidemic disease has been fatal chiefly from scarlatina, whooping cough, croup, and measles. These are diseases which are necessarily incidental to almost every individual in early life, and therefore must from time to time occur. No sanitary provisions can prevent these ; but unquestionably they can materially reduce their mortality by promoting that healthy status which resists epidemic influences, and by preventing over-crowded dwellings, and enforcing ventilation, so diluting the intensity of the virus as to make the disease comparatively speaking inert. Only two deaths were registered from small pox in 1866 ; in the previous year, however, there were 44. Dr. Seaton, one of the medical officers of the Privy Council, visited Cardiff a short time previously, and reported strongly on the inefficient manner in which vaccination had been enforced in this town. A measure is now before Parliament having for its object a more effectual system of vaccination throughout the country, by the infliction of penaltics on parents who neglect to adopt this valuable prophylactic aid.

The only remaining diseases to which it is necessary I should direct your attention are diarrhœa and dysentery, cholera and choleraic diarrhœa.

The deaths from simple diarrhœa and dysentery during the the year 1866 were 19, this being at the rate of 0·506 per

thousand of population ; the death rate of the kingdom from these diseases in 1864, when no unusual intestinal disorder prevailed, being 0.847. Cardiff, therefore, as relates to diarrhœa and dysentery, was in a satisfactory state.

Some considerable anxiety, however, prevailed throughout the kingdom, as epidemic cholera had so far advanced from the east in the spring quarter of 1865 as to be prevalent in Egypt, with which country our maritime ports are in continued communication. Later than this, and in the early part of 1866, this apprehension was aggravated by the fact that France, Belgium, and Holland were suffering from this disease. Some few cases of cholera had, moreover, occurred in the autumn of 1865 at Southampton and one or two other places, but it was hoped these partook of the character of the sporadic form of that disorder.

In the summer quarter of 1866, the Registrar General reports the existence of malignant cholera in many places throughout this kingdom.

I have now to call your attention to the disease as it affected Cardiff during the past year. I may preface this description by stating that the town suffered very severely from cholera in 1849 and in 1854. The following table indicates the mortality as it prevailed during the three visitations.

TABLE XIII.

Years.	Estimated Population.	Total Number of Deaths.	Proportion of Deaths to every 1000 Inhabitants.	Total Number of Deaths from Cholera.	Proportion of Deaths from Cholera to every 1000 Inhabitants.
1849	16,000	864	54·00	350	21·80
1854	26,500	925	34·90	175	6·36
1866	37,500	882	23·52	47	1·25

The cholera mortality of Cardiff during 1846, therefore, contrasts most favourably when viewed in reference to the mortality of the previous visitations, as it does also when compared with its recent visitation in other districts in this county; as in 1866, 500 deaths took place from cholera at Swansea, 476 at Neath, and 65 at Bridgend.

I have now to describe the circumstances under which it appeared in this town.

Of the 47 deaths from cholera registered in Cardiff, 4 were described as sporadic cases; the first of these took place in February, the others were scattered at long intervals. These differed essentially in their nature, all of them having the usual biliary evacuations of what is termed the English Cholera.

On the 23rd of day of July, I was requested by the authorities of the Custom-house to visit a vessel, named the *Cormorant*, which had the night previous arrived in the Roads with a corpse on board. I did so immediately, and found that the vessel had sailed direct from the East London Docks, where cholera existed, and that on its passage the deceased was taken ill with the usual symptoms of cholera, and died while the vessel was off St. Ives. The body presented the appearances observed in that disease. I ordered it to be buried immediately at sea; the cabin, in which deseased lay, to be fumigated with disinfectants; the clothes burned; and all communication with shore prevented as far as could be, with due regard to the business of the ship.

The next day I was called to visit a steam-vessel called the *Sabrina*, which had also arrived from the East London Dock; before reaching the Roads, one of the seamen had died, it was alleged, of cholera. I did so; and from the information I received, I had no doubt this was a death from cholera; but the corpse being sewn up in some sail-cloth, I had no opportunity of examining it. The captain described the deceased as having joined the ship suffering from intemperance, and that he had every reason to believe he had for a few previous days been leading a dissipated life in the purlieus of the London Docks. The directions given in the former case were repeated. I visited the ship in the Roads repeatedly, and daily examined the whole of the crew. For some days they continued free from diarrhœal disease; but one poor fellow, named Thomas Monarty, was much terrified, so much so, that while the others were in constant attendance on the man first ill, no appeal could induce him to visit his sick comrade, or render any assistance. On the 27th, after receiving a letter that one of his family residing in London had died of cholera, he became still more agitated, was suddenly seized with choleraic symptoms, and died, showing in a marked degree the ill effects of fear, and the importance of imparting confidence to those necessarily exposed to the dangers arising from the contact with epidemic disease. No others on board the vessel suffered from cholera.

On the 10th of August, another seaman belonging to a French vessel was taken ill, while the vessel was in the Bute Dock. The same instructions for freeing the ship from infectious disease were adopted, and the vessel ordered into the Roads. The sick man was removed to the Cholera Hospital, where he died in a few hours.

On the 11th, a poor woman attending one of the cases of cholera on board ship, was seized with cholera, taken home to Hannah-street, and died in a few hours. I immediately visited the house, ordered the immediate interment of the body, and that the clothes should be destroyed, the room to be fumigated by means of the evolution of gas from the mixture of black oxide of mangams, chloride of sodium, and sulphuric acid.

On the 13th, a French sailor, in another foreign vessel, was taken ill, removed to the Hospital, and died.

On the 22nd, another foreigner was taken ill on board his vessel. He was removed to the Cholera Hospital: he also died in a few hours.

In all these instances, after the vessel had been thoroughly inspected, and as far as practicable fumigated, and the whole of the crews personally examined, they were immediately, for the safety of the shipping and the port, ordered into the Roads.

No other case of cholera occurred in the town until September 11th, being an interval of upwards of seven weeks, although continued importation of fresh cases of the disease took place; the whole of the cases, so far, being confined to the shipping, except that of the poor woman who resided in Hannah-street, but who had been nursing one of the sick seamen on board a French vessel. This result was exceedingly satisfactory, as it testified the value of the remark made by the Registrar General of the importance of attention to the hygienic condition of our merchant vessels and our seaports.

Throughout the whole of the summer a careful supervision of the town had been exercised; as far as practicable all excitants of disease in the shape of nuisances in and around dwellings removed. I also made application to your Board for two additional police-officers to assist Inspector Hibbs in the discharge of this important duty. On the occurrence of the case of cholera in Hannah-street, the time had arrived when I considered it necessary to suggest the formation of a joint committee of your Board with some of the members of Board of

Guardians, as an order of the Privy Council constituted the latter Board an authority to exercise certain provisions of the Sanitary Act. This was done, the committee meeting daily.

This committee immediately issued a circular to the whole of the medical gentlemen of the town, inviting them to report to each meeting the extent and nature of any epidemic disease coming under their observation. This was readily complied with, thus enabling the committee to judge of the necessity of increasing their sanitary provisions in any part of the town, where, according to these reports, undue sickness prevailed.

In addition to the extra policeman appointed by your Board to assist Mr. Hibbs, the inspector of lodging houses, the committee engaged a certain number of house visitors, who discharged their duties most effectively. They reported not only the number of occupants, but also the general condition of the houses and premises visited by them, and the extent of sickness, if any. This had many advantages, inasmuch as the painless character of the premonitory diarrhœa in those suffering from it, disarmed suspicion of its danger, and gave a false sense of security ; and so the warning and instructions given by these house visitors caused many to apply for medical aid, who would otherwise have neglected to do so until that aid became inoperative.

The committee provided buckets and brushes, which were lent out to the poor, and enabled them to cleanse and lime-wash their houses when necessary, or when directed to do so by the inspectors. Rooms situated on the ground floor were expressly forbidden to be occupied as bedrooms, which enabled all occupiers of apartments to avail themselves of an additional room to cook and discharge other domestic duties, and allowed a more thorough ventilation of sleeping apartments.

Measures were also vigorously adopted by the committee to compel immediate removal of all nuisances and excitant causes of disease.

The latrines were constantly inspected. These required especial watching. The carelessness, and, in many instances, the filthy habits of many of the occupants of houses in the Irish districts make these conveniences a constant source of disease. These latrines have ejects, and, unless these are well supplied with water, become a source of disease. In cottage property, it has not been so far the practice to insist on water being laid on to the closets, the use of it being occasional only. From the

development of recent theories as to the mode in which choleraic diseases are propagated, and the weight given to these theories by careful observation, it becomes a serious question whether a more decided action, in requiring the actual laying on of water to all closets, should not be taken. The closets are usually arranged in pairs, and the estimated cost for two closets is six pounds, and for isolated single closets, four pounds. A more frequent and immediate removal of all offensive or infectious matter must result, and with proper arrangements of the cisterns and apparatus, no inconvenience could arise.

Disinfecting agents, as Condy's Fluid, McDougal's Powder, and Burnett's Fluid, were freely given to all unable to purchase them. These agents were thrown into cesspools and gulleys wherever they were offensive.

The deaths from cholera, with the localities in which they occurred, are enumerated in the following table. Remarks are also appended, describing the condition of the house or locality, as also the existence, if any, of an excitant cause of disease.

TABLE XIV.—DEATHS FROM CHOLERA.

Date.	Locality.	Sex.	Age.	Occupation.	Remarks.
Aug. 4	Board ship	M.	24	Seaman	Imported case.
„ 10	Cholera Hospital ..	„	42	Ditto	Ditto ditto
„ 11	2, Hannah-st	F.	48	Widow	Nursed a seaman with cholera.
„ 13	Cholera hospital....	M.	22	Seaman	Imported case
„ 22	Board ship	„	29	Ditto	Ditto ditto
Sep. 11	5, Little Frederick-st	F.	69	Labourer's widow ..	House supplied with well water; well close to cesspool.
„ 13	Harrowby-st	M.	20	Ship-rigger.....	Locality badly drained; open sewer near house.
„ 17	1, Rosemary-st	„	19	Irish labourer	Irish overcrowded house.
„ 17	43, Scott-st.....	F.	34	Tradesman's wife ..	Locality badly drained.
„ 17	34 St. Mary-st	M.	3	Seaman's child	
„ 20	Cholera Hospital ..	„	20	Seaman	Imported case.
„ 20	Harrowby-st	„	24	Shipbuilder.....	Locality badly drained.
„ 20	30, Davies-st	„	36	Platelayer	Arrived in town ill; died day after arrival.
„ 21	14, Tyndal-st.....	„	50	Journeyman Fitter.	
„ 22	Union	„	59	Inmate	Case of cholera imported into house.
„ 22	James-st.....	„	63	Tradesman	Health previously had; taken ill after exposure to rain.
„ 24	15, Whitmore lane	F.	45	Labourer's wife	Arrived in town ill day previous.
„ 25	57, Tyndal st	M.	44	Labourer	
„ 25	15, Homfray-st	F.	15	Daughter of carpenter	Delicate health previously.
„ 25	9, Ditto	„	82	Widow of lime-burner	House supplied with well water.
„ 26	Union	„	55	Matron	Case previously imported from shipping.
„ 26	Ditto	„	26	Inmate	Ditto
„ 27	Ditto	M.	60	Ditto	Ditto
„ 27	15, Thomas-st	F	28	Hobbler's wife	Irish over-crowded house.
„ 29	48, South William-st	M.	28	Rigger	
„ 30	34, Scott-st.....	F.	40	Labourer.....	Locality badly drained.
„ 30	Cholera hospital....	„	2	Labourer's child....	Cases imported from shipping,
„ 30	12, Gough-st	„	69	Seaman's wife	Locality badly drained.
Oct. 1	13, Wood st	„	42	Boiler-maker's wife	Ditto
„ 1	Cholera Hospital ..	M.	43	Seaman	Imported case.
„ 2	10, John-st.... ...	F.	45	Labourer's wife	
„ 2	24, Alice-st	„	74	Independent	
„ 6	2, Harris-court	M.	3	House-painter	House filthy; had been warned of consequence.
„ 8	5, Frederica-st	F.	30	Labourer's wife	Irish labourer; house overcrowded.
„ 8	26, Francis-st.....	M.	30	Fitter	Second case: first case brought on by over-fatigue.
„ 8	Union	F.	40	Inmate	Case previously imported from shipping.
„ 8	Canal-st	M.	20	Mechanic	Cesspool of privy very offensive.
„ 13	26, Francis-st	F.	4	Fitter's child	Third case in house
„ 11	Union	„	44	Inmate	Case imported previously from shipping.
„ 14	5, Little Frederick-st	„	22 m.	Labourer's child...	Infantile cholera.
„ 17	13, Quay-st	„	45 yrs	Publican's wife	Second case in house; house supplied with well-water.
„ 19	45, Louisa-st	„	31	Dressmaker.	
„ 23	12, High-st	„	30 m	Tradesman's child.	

Another case, not registered, occurred in the house in Francis-street. An examination of the above table shows that, except in six cases, no instances occurred of more than one death from cholera in the same street. It also shows that the epidemic was confined to no particular district, but that the cases were dotted through the town generally, and therefore marks in a strong degree the satisfactory state of Cardiff to resist the influence of an epidemic so eminently contagious as cholera.

In the early period of the epidemic, the Privy Council required the provision of a hospital for the reception of cholera cases from the shipping. The joint committee before alluded to directed me to obtain one, and I selected three large houses in Tyndal-street. This locality was conveniently situated both as regarded the shipping and also as being near the districts of the town where I feared the disease most likely to be severe. The houses were large and airy; one was selected for the sick, the other two appropriated for any special circumstances for which they might be rendered useful during the epidemic.

The first case that occurred among the inhabitants of the town was that of a female, aged 69, residing in Little Frederick-street. Upon receiving information from the medical gentleman I visited the case. I may here state that I am greatly indebted to my professional brethren for the ready manner in which they called my attention to any cases under their individual care, as it enabled me to visit and inquire, with very few exceptions, into every case.

At this house, the only cause accounting for the disease was that the supply of water was obtained from a well, and this well was closely adjacent to the cesspool. The information I obtained of the ill effects of impure water supply were very marked in the few instances I am enabled to select. When I visited a large foreign vessel, named the *Antonia*, I found a fatal case had occurred during the night, but the deceased had not been attended by a medical man. I inquired fully into the circumstances of the case, as I did in every other instance I visited. The ship was a large one of 3,000 tons burthen, was clean and comfortable, having a crew of 43 men. I inspected these personally, and found 13 suffering from severe diarrhœa, the whole of whom had been taken ill within the last few hours. The crew were well provisioned, and had every accommodation they required. Upon my questioning the captain as to the purity of the water, he stated that his tanks

were properly supplied from the Company's water, and that the men had free access to it; but upon going more fully into the subject, he recollected that within the last few days his tanks had been emptied for the purpose of having them cleansed, and during this time the men had to supply the ship with water, and were desired to get it in small barrels. This was done, he feared, from the water in the Bute Ship Canal, which receives the bilge water and sewage from 300 or 400 vessels constantly in the port, and therefore to some degree may be considered an elongated cesspool. The use of this water was immediately forbidden, a fresh supply obtained, and the crew from that time, although remaining in the port some weeks, were free from disease.

Two other houses in Cardiff obtained their supply of water from wells. But the strongest instance of the ill effects of an impure water supply was that of the houses in North Morgan-street, Canton. On receiving information of the circumstance of several deaths from cholera I visited this street, and elicited the following facts:—The disease existed in a block of nine houses, four houses being in the upper part of North Morgan-street, the remaining five in Wellington-street. In No. 1, a family of eight persons resided: in this family three were ill with choleraic diarrhœa, and two with cholera. The two with cholera died. The water supply was from a well, and used by the inmates of this and the three adjoining houses. The inmates, when they could, endeavoured to obtain water from neighbours who had their supply from the Company's water; but as this was illegal, it could not often be allowed. The children had free access to the well water, and used it for drinking. I examined the water, having obtained it myself; it smelt abominably, and was coloured. On testing it with 10 drops of the permanganate of potash to 1 ounce of the water, the decoloration commenced immediately; in 12 hours the water was colourless. The occupier of this house, as well as the others in which the disease occurred, attributed the illness to this water. In the next house a family of six resided; three of these had choleraic diarrhœa. In the next house five resided. of whom four had the choleraic diarrhœa. In the next, three resided; one had the choleraic diarrhœa, and one died of cholera. The next house contained a family of eight persons. These did not use the pump water, as they were afraid to do it, but obtained their supply from neighbours. None of these were ill. The next

house had thirteen inhabitants ; one of these had diarrhœa, one died of cholera. In this house the inmates sought for water as they could from their neighbours ; but when this could not be obtained, they used the well water. The remaining three houses had their supply from the Company's water, and at no time during the epidemic suffered from illness.

These houses, until August, obtained their supply of water from the Company's water, but at that time it was cut off. This was much to be regretted, as the district was then threatened with cholera.

The subsoil of Canton is a very light porous gravel, and always filled with water, so much so that whenever any work in the shape of laying pipes in the streets is being carried on at the depth of two feet, the water is obliged to be pumped out of the excavations. The district is badly drained, the surface water is only partially carried off, and surface impurities sink into the subsoil. There is no deep drainage, consequently no water closets. The fluid contents of these cesspools can but percolate through the light gravel, and, wherever wells are sunk, must pollute them. I requested the committee to forward some of the water to London for analysis by an eminent chemist, who reported as follows :—

THE ANALYSIS OF THE WATER OBTAINED FROM NORTH MORGAN-STREET.

	Grains in Imperial Gallon.
Carbonate of lime and magnesia	24·54
Sulphate of lime and magnesia	36·60
Chloride of sodium	27·18
Iron alumina	0·22
Selica	0·30
Organic matter and loss	3 09
Total	91·83

He makes the following observations :—"This water is by no means fit for a town supply. It is objectionably hard, the hardness before boiling being 60 degrees, after boiling, 44. The amount of organic matter is relatively excessive. The large quantity of common salt found in it denotes some connexion with either sea water or sewerage."

A few days after this, when the medical officer of the Privy Council was inquiring into the sanitary condition of the town, he visited this locality, and was shown some water out of the

well, which contained two or three large worms, and so corroborated the report of the contamination of the water with organic impurities.

One of the most frequent excitant causes of cholera, namely, bad drainage, did not exist in this town, except to a very limited degree, and that in localities where houses had been erected after the completion of the drainage system: I allude to Temperance-town and Harrowby-street.

Temperance-town has been built on a very low level, rendering its communication with the town system of drainage a matter of some difficulty. The subject has attracted the attention of your Surveyor, and the evils resulting from the imperfection of the drainage in this locality will be remedied. Four deaths from cholera were registered here. The first occurred in Scott-street, in a house occupied by a respectable family. On receiving intimation of this case from the medical gentleman in attendance, I visited the house: its general condition was most satisfactory; but on examining the back area, I found this had been recently floored — that sewage from the cesspool had escaped into this surface water, and the underground kitchen was inundated with it, to the extent of about two feet, about the time the patient was attacked with choleraic symptoms. To add to the ill consequences likely to accrue from this evil, the abandoned old bed of the river closely adjacent contained large quantities of stagnant water, mixed with decaying animal and vegetable refuse matter, the exhalations from which were at times very offensive. On the southern boundary also of Temperance-town, a lake of sewage matter existed. These two operated very unfavourably on the health of the inhabitants in the immediate locality.

In a row of houses at Harrowby-street, near the old Sea-lock, two deaths took place from cholera. The surface drainage formerly escaped into the river, but the construction of a new road cut off this communication. The subsoil is a stiff clay; it therefore follows that the cesspools at times rapidly fill to overflowing, the contents escaping into the gardens. This was the case during the prevalence of the epidemic, and localized the effects of the disease.

A fatal case occurred in Canal-street. The house here was very clean, but the sewage of the cesspool had escaped into the garden, and was very offensive.

While on the subject of drainage, I may call your special attention to the fact that at the ventilating shafts or flues noxious gases escape, and are at times a probable source of serious evils. During hot weather, the exhalations from them are much complained of by occupiers of houses adjacent, who state that they frequently experience very sickening sensations. Agreeing entirely with that portion of Mr. Waring's Report relating to the ventilation, and being well aware of the inconveniences of the present system, I would advise that observations should be made of the flow of the air currents at various points, and, if practicable, a complete deodorization of the gases in their escape, or the adoption of some means of discharging them at points suffieiently high to render them innoxious.

Some provision also should be made for at least the surface drainage of the houses in Cathedral-road, for which no outlet is at present provided. Probably an arrangement similar to that adopted in Cowbridge-road might be sufficient.

The discharge of the fœcal drainage from the Union-house into the Whitehouse brook opposite Temperance-town is very objectionable, now that a road is contemplated which will open out the land for building purposes.

That only three deaths from cholera should have been registered among the Irish labouring population, numbering upwards of 9000, can but be viewed as an indication that the supervision of the houses of this class of our inhabitants has been very effective. The house in Rosemary-street, where the fatal case occurred, has always been a source of great difficulty, neither persuasion nor even legal penalties seeming to have any effect in preventing its occupier overcrowding. If the number of inmates were reduced one day, in less than a week the excess of numbers would be restored. The medical officer of the district continually reported the existence of fever; and after the occurrence of cholera, I caused the whole of the inmates to be ejected, and the house for a time to be unoccupied.

The occupier of No. 2, Harris's-court, had been again and again warned of its filthy condition, and the probable consequences to be anticipated, but with little effect beyond a very temporary attention to instructions given.

A case of cholera in a very severe form occurred at the Slaughter-house, but this was not fatal.

During the epidemic, six deaths from cholera occurred among the seamen, and two from choleraic diarrhœa. The first case of

cholera in the Union-house was that of a seaman received into this establishment; after this, six of the inmates died from the disease, thus showing the urgent necessity of establishing a seaman's hospital, into which the sick seamen can be received without bring carried into the town.

Having described the local excitant causes of cholera, I may state that in some few instances where predisposing causes existed, the immediate cause was unmistakably errors in diet, and in two other instances over-fatigue; this was especially the case in the house in Francis-street. The first case in this house was introduced by an engine-driver, who had undergone great physical exertion; after this, two more fatal cases occurred in the same house, and were doubtless to be attributed to the contagion introduced by the first, the house and premises being in a very satisfactory state.

I have thus specified some of the special circumstances requiring observation, under which several of the cases of cholera occurred. In order as far as possible to prevent extension of the disease, I adopted the following measures.

Upon receiving information of a fatal case of cholera in any house—and through the courtesy of my professiona. brethren there were very few not reported to me—I visited the house, and urged on the inmates immediately to leave. In order to be in a position to do this, I recommended the sanitary committee to hire three large houses in Tyndal-street. One of these was appropriated to the purposes required by the Order in Council; the remaining two were available when the inmates of an infected house required temporary shelter. With very few exceptions, this advice was readily adopted, and, as in the epidemic of 1854, with the most satisfactory result. No second case of cholera occurred in any family who followed this suggestion; and in every case of cholera visited by me, I could in no instance connect it with any contagion received from those who left an infected house. While in the few instances where this advice was disregarded, others succumbed to the disease, as in Francis-street, Quay-street, Milton-street, Roath, and in a very striking degree at St. Mellons, where, in a small house occupied by a family of five persons, four of these died of the disease.

I also caused immediate interment of the dead; arrangements having been made with Mr. Stone, the undertaker, to enable this to be done without delay.

All articles of clothing worn by the sick, as well as bed clothing, were destroyed.

The room was disinfected by placing in it vessels containing binoxide of manganese, salt, and vitriol; the chlorine gas evolved being retained by closing the window and every aperture.

The floors were afterwards washed with a solution of carbolic acid, and the walls limewashed.

McDougal's Disinfecting Powder was thrown into and over every place where the excreta could have been received.

The cases of choleraic diarrhœa were as follows :—

TABLE XV.

Date.	Locality.	Sex.	Age.	Occupation.	Remarks.
July 23	Ship	M.	43	Seaman	On board ship.
„ 31	Herbert-st	F.	66	Widow.....	House crowded; well-water supply.
Aug. 10	64, Union-st	M.	9 wks	Brewer's child..	Infantile diarrhœa.
Sep. 11	29, Tredegar-st..	F.	49	Widow.....	Suffering previously from long continued ill health.
„ 13	Sandon-place ..	M.	3	Mason's child ..	House damp; some error in diet also.
„ 14	Ship	„	49	Seaman	On board ship.
„ 21	71, Bute-st	F.	72	Carpenter's wife	
„ 26	Union	M.	67	Tailor	
Oct. 8	19, Canal-st	„	20 m.	Coalheaver's child	Infantile diarrhœa.
„ 9	49, Sandon-place.	F.	73	House proprietor	
„ 11	Union.....	„	44	Inmate	

Before quitting this subject, I have to urge on your Board in nowise to relax all stringent measures necessary to protect the public health. This is more essentially necessary, in that cholera has within the last few weeks reappeared, although in a mild degree, in one or two towns in England and at Glasgow.

I would also submit that a present absence of epidemic disease cannot be received as conclusive evidence of a non-proclivity to receive it. According as a locality approaches a high or low sanitary state, so it resists or succumbs to epidemic influences. When this is very bad, a very light inoculation of zymotic disease is able to produce a most deadly sequence. This was marked in the introduction of cholera during the last year at Abergorki. In consequence of an alarming outburst there, I was requested to visit this village, when I elicited the following facts :—On the Friday se'night, three cattle dealers had occa-

sion to go to the Vale of Neath for the purposes of their business, where cholera was raging. They walked the distance both to and fro, and were much fatigued. The following day they all three walked to Cowbridge; but, as one of them felt ill, and suffered from diarrhœa, they returned by train. When they arrived at the station, the sick man was too ill to walk thence to his home, although the distance was short. He soon became attacked with unmistakeable choleraic symptoms, and died. A second one also was taken ill, and died on the Monday. The third also suffered severely, but ultimately recovered. On Wednesday the disease broke out with alarming force, and by Saturday morning, when I visited Abergorki, twelve deaths had taken place. Accompanied by Mr. Davis, the medical gentleman in charge of the sick, I visited every house in which sickness had occurred, and also took a very careful survey of the village. The inhabitants were literally panic-stricken, and eagerly replied to every question I put to them calculated to throw any light on the cause of this lamentable outbreak. The village comprised about 60 houses; the inmates of which were exposed to the consequence of a sad neglect of sanitary precaution. There was an absence of anything like proper privy accommodation. In one row, one privy was provided for three houses, but to get to this it was necessary to step over the hedge dividing the garden of each house. Cesspool matter was behind and before every house; the gulleys were filled with stagnant fœtid matter; the surface area of a small square, bounded on two sides with dwellings, was completely saturated with soakings overflowing from two privies placed *dos a dos* in the centre, and exposed to the windows looking into the square. In these houses cholera was very fatal, and from one of them I saw a female empty before her door a vessel containing the excreta of a cholera patient then ill with the disease. The houses were overcrowded to a fearful extent. In a room, hardly exceeding 1,200 feet cubic space, sleeping accommodation was afforded to five men; the room being occupied by relays: as one batch left to go to ~~wash~~ work, another entered. The water supply was limited, not in extent of water, but in the facility of getting it, as many of the occupiers of houses had to go some distance for it, there being only two places where the water could be obtained, one of these being of very doubtful purity. I reported this state of things to the local authority for the removal of these strongly excitant causes of disease,

with the hope that efficient measures might be adopted to meet the requirements of the village. The attention of the inspector of nuisances for the district was directed to my report, who, while admitting to some extent the accuracy of it, in reply stated, as a singular matter for the satisfaction of the Board, and as an excuse for the absence of sanitary regulations, that there were other localities in the Pontypridd Union where the state of things was worse. The grievous fact, however, remains, that in five days twelve of our fellow-creatures, in a village with probably less than 600 inhabitants, died of cholera. And as the excitants of cholera and fever are the same, I fear the improvement of the district is not great even now, inasmuch as fever has recently severely prevailed in that district.

I have thus gone somewhat more elaborately than usual into the various matters relating to the sanitary condition of Cardiff for the year, as this will probably be the last occasion I may have to address you. I must, therefore, in conclusion, take this opportunity of acknowledging the readiness with which your Board, and also the Board of Guardians, in your individual as in your joint capacity, adopted every suggestion I made to you. I need hardly say that such confidence stimulated me to prosecute with vigour all means which appeared to me to be necessary to protect the public health from the dangers to which it was exposed during the visitation of the late epidemic; and in the hope that we may happily be spared another visitation,

Believe me to be,

GENTLEMEN,

Your obedient Servant,

H. J. PAINE, M.D.,

MEDICAL OFFICER OF HEALTH

WILLIAM JONES, PRINTER, DUKE STREET, CARDIFF.